

In the Specification:

Please replace the paragraph beginning on page 11, line 9, with the following paragraph:

(b) --With reference ~~[not]~~ now to FIGURE 2, a more detailed illustration of the scan controller 130 interfacing between computer 110 and MRI unit 150 is illustrated. Scan controller 130 is in communication with computer 110 over data links 202 and 204 for respectively sending and receiving digital data thereover, although a single bi-directional data link could be substituted therefore. Timing of all interactions, including frequency and phase settings for the respective transmitter 190 and receiver coil 195, with MRI unit 150 is coordinated by synthesizers 230 integrated within scan controller 130. In a preferred embodiment, synthesizers 230 include two synthesizers which interface with two synthesizer DACs 231 and 232. The scan controller 130 interfaces with three gradient DACs 240, 242 and 244, each providing a gradient field in mutually orthogonal planes, as well as two RF shaper DACs 250 and 252. To control and operate an advanced MRI unit as in the preferred embodiment, at least seven DACs are needed to transfer digital input between the scan controller 130 and the MRI unit 150. However, the preferred embodiment is capable of numerous modifications and rearrangements which would require more or less than seven DACs. Gradient DACs 240, 242 and 244 are supplied with digital gradient information describing the x, y and z gradient fields over respective gradient DAC input lines 241, 243 and 245, as defined by the MRI pulse sequence received by scan controller 130 from computer 110. Gradient DACs 240, 242 and 244 then convert the digital gradient data to corresponding analog gradients which are transmitted to respective gradient coils 180 over gradient DAC output lines 246, 247 and 248. Thus, gradient DAC 240 is responsible for driving one gradient coil, e.g., gradient coil 180 X of the set of gradient coils 180. Likewise, each of gradient DACs 242 and 244 are responsible for driving a corresponding one of the remaining gradient coils 180, e.g., respective gradient coils 180 Y and 180 Z.

Please replace the paragraph beginning on page 14, line 4, with the following paragraph:

(b) --RF shaper DACs 250 and 252 are responsible for converting the RF shape data, received over output lines 251 and 253, from the digital domain as defined in the MRI pulse sequence received by the scan controller 130 from computer 110, and modulating the

representative RF shapes accordingly. The RF shapes are received and modulated by transmitter coil 190, generally at the Larmor frequency, to the subject specimen being analyzed in aperture 155. The frequency and phase of these modulations are controlled by synthesizers 230 over control lines 260 and 261. The echo resulting from the applied gradient waveforms and RF pulses is acquired by the receiver coil 195 during the relaxation periods and accordingly transmitted to the scan controller 130. Proper acquisition of the echo is facilitated by frequency and phase settings applied to the receiver channel by synthesizers 230. These frequency and phase settings are supplied to the scan controller by the MRI pulse sequence data received from computer 110. Thus, the MRI pulse sequence provided by computer 110, under command of an operator thereof, directs the operations for echo generation and acquisition.

Please replace the paragraph beginning on page 15, line 10, with the following paragraph:

The present invention allows for efficient creation and customization of generic pulse sequences through a primary design interface 300, i.e., a graphical user interface presented in the form of a window 305, presented on display 120 and generally depicted in FIGURE 3. The design interface consists of a number of user selectable menu editor items, e.g., New Sequence 310, Sequence Tailor 320, and Delta Size 330, as well as the common WindowsTM menu editor items, e.g., File 340, Edit 350 and View 360, all contained within the mainframe window 305. Various toolbar editor items, e.g., Open File 370 and Save 380, may be located below the menu editor items. Selection of a given menu choice initiates generation of a drop-down box, e.g., drop-down box 390 resulting from user selection of the new sequence menu editor item 310. Each of the menu editor items will generally have a drop-down box associated therewith, each of which generally provide the user with additional selections associated with the selected menu item. A specific dialog box may be activated by selection of a drop-down box item. For example, a New Sequence drop-down box item 396, when selected, activates a specific dialog box (not shown) that allows the user to create a sequence from scratch. A Fast Spin Echo (FSE) drop-down box item 392, when selected, activates a dialog box that allows the user to edit a Fast Spin Echo sequence; likewise a Fast Gradient Echo (FGE) drop down box item 394, when selected, activates a dialog box that allows the user to edit a Fast Gradient Echo sequence. The user has unrestricted freedom to

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END build a sequence from existing types, while providing the advantages of copy, modification, and other functions provided by the user interface.

Please replace the paragraphs beginning on page ¹⁹20, lines 15, 16 and 18, and page ²⁰21, line 1, respectively, with the following paragraphs:

--RF [580] 704 -- a maximum positive amplitude of a RF shape is of 100 scaling units;

SS [704] 706 -- the gradient plateau corresponding to the slice selective RF pulse is of 100 scaling units;

B4 RO [706] 710 -- the gradient plateau corresponding to the data acquisition window is of 100 scaling units; and

PE [714] 714 -- the absolute maximum amplitude among all the PE plateaus, which are stepped during the scan, is of 100 scaling units.

Please replace the paragraph beginning on page 22, line 13, with the following paragraph:

B5 --If the user selects the select types button 904 in the shape editor dialog box 900, as shown in FIGURE 9A, a shape selection dialog box 950 is displayed, as shown in FIGURE 9C. A shape drop down box 952 within the shape selection dialog base 950 displays the current selected shape. By selecting the drop down arrow 954, the shape drop down box 952 expands to provide the user with a selection of available RF shapes, such as Gaussian, Gasico, Hermite, etc. Selection of a RF shape different than the current RF shape will result in the RF plot, SS plot 708, RO plot 712, and the PE plot 716, being redrawn for display upon return to user interface 305. Preferably, prestored numerical shape files may be accessed through selection of the shapes available via button 956.

Please replace the paragraph beginning on page 26, line 10, with the following paragraph:

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CMT --FIGURE 11 illustrates a preferred embodiment of the present invention when a Scan a Gradient Wave option 1006 is selected from the ScanSettings menu editor item 1000. The ScanSettings drop-down box 1002 and the MRI Scans option 1004, as described hereinabove

36 in connection with FIGURE 10A, are shown for illustration. Upon selection of the Scan a Gradient Wave option 1006, an interference dialog box 1100 is displayed. Selecting the OK button on the interference dialog box 1100 causes a Setting of Gradient Wave Scan dialog box 1120 to be displayed. The Setting of Gradient Wave Scan dialog box 1120 allows a user to enter a particular window location and size with which to compare the input and output retrieved from the magnetic field. The user may enter values in a variety of parameter boxes, e.g. a sequence name box 1122, a sequence repetition times box 1124, a number of data acquisition box 1126, and a sample interval box 1128--

Please replace the paragraph beginning on page 34, line 1, with the following paragraph:

37 --In FIGURE 18B is illustrated an exemplary artificial harmonic signal as may be displayed in frames 1802, 1804, 1806 and 1808 of the sequence tuning dialog box 1800, and the control menu section 1810. The real and imaginary part of the artificial harmonic are respectively plotted in frames 1802 and 1806 while the amplitude and phase of the echo are respectively displayed in frames 1804 and 1808. In addition to the MRI echoes, gradient waveforms and RF shapes could also be displayed in the sequence tuning dialog box 1800 frames--

Please replace the paragraph beginning on page 34, line 7, with the following paragraph:

38 --A scan parameters dialog box 1900, as illustrated in FIGURE 19, is generated by user selection of the scan menu editor item 1710, located in FIGURE 17, for performing a phantom scan as part of the calibration process. Numerous scan parameters are displayed therein, e.g., TE 1902, number of slices 1904, TR 1906, NEX 1908, levels 1910, ETL 1912, and slice plane 1914. Some values are modifiable by the user while static values are shaded so that the user can view, but not modify, the parameters. Selection of the scan button 1916 will initiate a scan, resulting in image reconstruction and display for user analysis--